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Epistemology and public policy: using a new typology to analyse the paradigm shift in Finnish transport futures studies

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Abstract

The aim of the article is to present a new typology of paradigms of futures studies with specific focus on decision-making. Possible roles of futurists and other actors in long-term planning and decision-making processes are formed using logical analysis. The resulting seven schools of thought are interpreted in the light of literature of futures studies and planning theory. Connections to the philosophical discussion on the role of knowledge and values in policy recommendations are presented as well. Some futures studies methodological applications are attached to the paradigms. The new typology forms a gradient from technocracy performed by professionals to direct citizen participation. Finally, the paradigm shift of Finnish national transport futures studies is analysed using the new typology.

1. Typologies of futures studies paradigms

Several typologies of futures studies paradigms[1] have been formed in the last decades. We begin with a short review of six typologies and conclude that they are limited to three schools of thought. A question can be raised as to whether the

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[1] In this article we use the concepts of paradigm and school of thought interchangeably. The concept of paradigm developed by Kuhn [1, pp. 1–51] has been criticised often. Kuhn [2, pp. 271–272] later suggested the concept of 'disciplinary matrix'. A concept has no intrinsic value and we use the ones that are understood generally. When describing the typologies by different authors we use their own concepts.

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multitude of alternative ways 'to do the job' is encompassed. We suggest that the role of the futurist as a professional, and the roles of the decision-maker and the public, could be characterised in a more diverse way in a long-term policy-making process.

Applying the Futulogic method, we open the space of logically possible roles of professionals and other actors in policy processes. After forming 343 logically possible hypothetical schools of thought we cut the open space with the continuum of extreme technocracy to extreme citizen participation. The scanning produces 15 hypothetical schools of thought which are analysed in terms of relevance and hence reduced to seven. The methodology is explained in detail in the appendix.

Then, we show the connections of the role of professionals and other actors within the seven paradigms to some practices in futures studies. We also attach the paradigms to the philosophical discussion of the role of values and knowledge in making policy recommendations. It is important to keep in mind our strict focus on only these two aspects in this article. No complete summary of typologies of futures studies paradigms is made here.[2]

Finally, we use the new typology to analyse the paradigm shift of the futures studies of Finnish transport administration in the 1990s. The approach of the article is illustrated in Fig. 1.

1.1. Probable, possible and preferable

Roy Amara [5, p. 26] made his famous typology of the three "goals" of futurists 20 years ago. For the goal of *possible*, futurists form perceptions of the future by conceiving and describing possible paths in an image-driven and visionary manner.

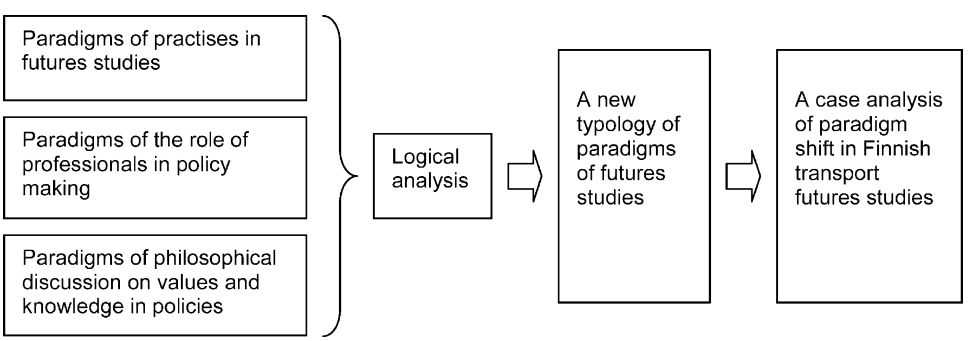

Fig. 1. The approach of the article.

[2] For example, the typology of Linstone et al. includes *techno-economic*, *organisational* and *personal* "perspectives" [3]. It emphasises the different entities to be analysed in a futures study. Pentti Malaska has presented a typology including as many as six "modes of thinking": *utopian thinking*, *dystopian thinking*, *thinking by analogy*, *systems thinking*, *scenario approach* and *evolutionary thinking* [4]. His typology stresses the multitude of substantial and methodological approaches. The focus of our article does not do justice to these two typologies.

For the goal of *probable*, futurists study likely alternatives by examining particular paths in detail, in an analytically-driven and exploratory manner. For the goal of *preferable*, futurists make choices to bring about a particular feature. They express preferences for, and work to, implement particular paths. Amara argued that the goals are not mutually exclusive and that many futurists perform all of the roles. However, the goals are of a different nature and Amara's typology seems to be the starting point for further typologies of different schools of thought in futures studies.

1.2. Technical, hermeneutic/practical and emancipatory

Jürgen Habermas' well-known typology of the three "interests of knowledge" [6, pp. 60–65; 7, pp. 19–24] was applied to futures studies by several authors in the 1970s and 1980s. It seems that Åke Sandberg [8, pp. 25–28] was the first, although he relied on Gerard Radnitzky's [9] interpretation of Habermas. The English volume of Sandberg's book [10, pp. 29–32] asserted the same typology of technical, hermeneutic and emancipatory interests of knowledge. Richard Slaughter presented another version of Habermas' typology in 1982 [11, pp. 17–20; 12, pp. 135–146], applying practical instead of hermeneutic interest of knowlegde, refering more directly to Habermas' original text. Mika Mannermaa [13, pp. 660–662] modified and cross-matrixed Sandberg's version of the three interests and Amara's goals. The result can be formed as follows:

In the *technical interest of knowledge* the aim is to search for objective trends and alternatives are considered irrelevant (possibility). Forecasting is the main task of a study (probability) and values are considered inessential, unscientific and/or self-evident (desirability). In the *hermeneutic interest of knowledge*, the "…main purpose is communication between people in a society and different tasks of futures research melt into a common understanding of the social reality" [13, p. 660]. In the *emancipatory interest of knowledge* the aim is to increase alternatives making impossible into possible (possibility). The probable is considered a reference alternative and usually an object of criticism (probability). In the emancipatory model it is more important to act in favour of the desirable future than search for a probable alternative.

1.3. Extrapolation, utopia and vision

In the early 1980s, Eleonora Barbieri Masini [14, pp. 45–46] developed another typology of three futures studies "approaches" based on an article by Peter Henrici. *Extrapolation* is an approach that includes an analysis of what may happen in relation to the data, information and knowledge of the past and present. It thus means wider actions than trend extrapolation by extending Amara's probable with aspects of the possible. We would say that what is extrapolated in this approach is not the trend but the structure of the past and present.

Utopian approach means the "…building of a future different from the present" [14, p. 45]. It concentrates on invention, innovation and imagination of highly desir-

able or non-desirable futures. This approach is similar to Amara's preferable goal and Mannermaa's emancipatory interest of knowledge.

The third approach is labelled *vision*, combining the first two approaches. It includes bringing the value considerations of utopias down to concrete programmes by relating them to the data, information and knowledge of past and present. The approach lacks clear correspondence to Amara's and Mannermaa's typologies, but rather presents a synthesis of them.

1.4. Predictive, cultural and critical

Sohail Inayatullah presented a somewhat similar typology of "epistemologies", or "approaches" as Sandberg, Slaughter and Mannermaa earlier [15]. Inayatullah's typology also had three schools of thought.

The *predictive–empirical* approach includes instrumentalist, rationalist ways of predicting the future accurately. The approach is equal to Sandberg's, Slaughter's and Mannermaa's technical interest of knowledge. Inayatullah strongly connected mathematical modelling to this school of thought. With accurate predictions preformed by the professional ("planner"), the decision-makers could better adapt to the coming state of the world [15, pp. 117–119].

The *cultural–interpretative* approach includes understanding of different values and cultures, different ways of approaching the future, negotiating about the different alternatives and acting in order to achieve the desired future [15, pp. 122–128]. The cultural—interpretative approach can be seen as a convergence of the hermeneutic/practical and emancipatory interests of knowledge by Sandberg and Slaughter. Masini's concept vision includes similar ideas as well.

What is then left for the third *critical-post-structuralist* approach? Inayatullah regarded the kind of emancipatory critical approach that Sandberg, Slaughter and Mannermaa had in mind as a revised version of the Enlightenment project, which for him appeared as the actual problem instead of a source of doing things better. Rather he saw a better option in the Foucauldian "post-structuralism", i.e. taking distance to the concrete planning situation, analysing the historical context of the situation, analysing and revealing the power relations inherent in the language that different participants have, assessing and if needed changing the power relations and making the future problematic [15, pp. 128–136, 140–141].[3]

In sum, Inayatullah crystallised the difference between the three approaches by specifying that the predictive approach aims at solving (technical) problems, the cultural approach aims at identifying alternative futures and the critical approach aims at making the future problematic [15, p. 141].

[3] Inayatullah wrote that a weakness of the critical-post-structural approach was the lack of suitable methods for such an analysis. Later he developed casual layered analysis for this purpose and included action learning to the critical—post-structural approach [16].

1.5. Positivism, critical realism and post-positivism

Wendell Bell [17, pp. 196–209] also formed three "epistemologies" for futures studies, namely positivism, critical realism and post-positivism. *Positivism* by Bell means the same as the probable of Amara, technical interest of knowledge of Sandberg, Slaughter and Mannermaa and predictive—empirical approach of Inayatullah. *Post-positivism* describes rather similar features to Inayatullah's critical-post-structuralist approach. The main difference is that for Inayatullah this was the ideal school of thought, whereas for Bell it was the object of criticism.

While positivism is the thesis and post-positivism its antithesis, *critical realism* by Bell is the synthesis of the two. It seems not to correspond any of the formulations of Amara, Masini, Sandberg, Slaughter, Mannermaa or Inayatullah. It consists of the idea of forming alternative possible futures and evaluating which of them is objectively good. It contains citizen participation in forming desirable or preferable futures but it also includes the idea that the citizen may be wrong. The objective evaluation of a future image (or scenario, development etc.) should be made by following the scheme of Keekok Lee's epistemic implication model relying on objective facts instead of subjective statements.

1.6. Descriptive, scenario paradigm and evolutionary

Later Mannermaa published another typology of futures research: descriptive futures research, scenario paradigm and evolutionary futures research [18]. The *descriptive futures research* is identical to the earlier technical interest of knowledge by the same author, Sandberg and Slaughter. The *scenario paradigm* includes forming alternative possible and preferable futures and choosing one of them. It represents a combination of Amara's possible and preferable and of Sandberg's and Slaughter's hermeneutic/practical and emancipatory interests of knowledge.

Mannermaa also discerned a paradigm of *evolutionary futures research*, which is based on the complexity discourse of system theory and especially on the works of the "Brussels school" [19] and Ervin Laszlo [20]. It includes the idea that society evolves through phases of linear development with fairly accurate predictability as well as through chaotic bifurcations where predictability is very low and human decisions and actions are essential. The goal of evolutionary futures research is to make forecasts in linear phases, identify bifurcations and make future assessments.

It is interesting to note that the first paradigm in all of the six typologies is very similar, only Masini's concept of extrapolation being a little wider. The similarity implies that there really is a discernible positivistic-technocratic-extrapolative-predictive-descriptive school of thought among futurists or at least in governmentary and business practise. The two other paradigms in the typologies differ, although the ideas presented in Amara's framework seem to be included in the other typologies as well. One school of thought in each typology differs significantly from those in other typologies and seems to represent the ideas that the author him/herself was in favour of.

These features lead us to two questions: Why are there only three schools of

thought presented in these six typologies? Could there be more paradigms, even relevant paradigms? We consider it important to continue the work of the authors and construct a more delicate typology.

2. A new typology

This section presents a new typology of seven schools of thought in futures studies. The emphasis is on the different roles of actors in a long-term planning and decision making process. We are interested in three groups: the professionals, the decision-makers and the public.

Professionals are typically employed futurists, planning officers, consultants, scientists, engineers, medical experts, teachers or other humans considered possessing more specific or legitimate knowledge of a substance than laypersons. *Decision-makers* consist typically of political bodies, managers, judges, councils, tribe meetings or other people having a responsibility and legitimacy of the final decision. *The public* consists of non-governmental organisations (NGOs), such as lobbying groups, residential organisations, religious communities, less organised one issue movements and of course individual citizens.

The groups are by no means static. One person could be in all groups depending on the actual social context of decision-making, for example a university professor in economics might be a professional in making econometric forecasts for the government, a decision-maker in his faculty council and a member of the public considering land use planning near his home. It is important to emphasise that none of the three groups is considered to consist of only middle-aged, middle-class western men, but senior citizens, women and young people are included. Even a nomad child wandering with her family in Sudan might have a role as a professional in the decision-making process of how to use scarce firewood resources in a given area. The reader is invited to see the articles in *Rescuing All Our Futures* [21] for more of this point.

The Futulogic method is used to create a new typology of seven schools of thought (see Appendix). The typology forms a continuum from technocracy performed by the professionals to direct citizen participation. The formulation is focused on the logical connections rather than the socio-historical context of each school of thought. The socio-historical context would add insight to the analysis but is beyond the scope of this article (see [16,22–24]). The typology serves as a framework to analyse the empirical case of transport futures studies in Section 3 of this article.

There are obvious connections of the formed seven schools of thought to the epistemological, methodological and social philosophical debate found in futures research as well as philosophy. We use this discussion as a theoretical context in interpreting the concrete ways to define the roles of different actors in a long-term decision-making process. Especially the role of (expert) knowledge and values in making policy recommendations are analysed. Some aspects of planning theory are also added to the analysis to further define the approaches of participatory democracy.

2.1. Comtean positivism

In the first school of thought we assume that the whole decision-making process is carried out by professionals. The professional forms the alternatives and, finds out the most probable one, which is then implemented as a fact in the more detailed planning process. Implicitly, the professional has then also made the most important decision.

The positivist philosophy would serve as the most adequate supporting argument for this rationale. We are thinking of Comtean positivism rather than of the logical positivist school of thought of the Vienna circle, which did not concentrate on making rules on making policy recommendations. Another well-argued source would be the naturalistic value-objectivism found in Plato's promotion of "serious thinkers" [25, pp. 55–61], which has been criticised by e.g. Beck [26, pp. 31–32] and Sardar [23, p. 2]. The main line of Comte's argument is that with sufficient research professionals will find out the invariances of society the same way natural scientists determine the laws of nature. In this way decision-makers can adapt to the natural laws of society. No value considerations nor democracy is needed [27, pp. 410–437, 459–473; 28, pp. 62–64].

Among futures researchers the positivist school of thought is often criticised but seldom defended and not even explicitly stated. However, numerous practices have been organised according to the positivist principle, such as the transport and energy forecasts in various countries [29–32]. The approach is similar to the concepts of probable by Amara, technical interest of knowledge and descriptive futures research by Sandberg, Slaughter and Mannermaa, predictive-empiristic approach of Inayatullah and positivism by Bell, as described in Section 1.

Comte himself did not favour mathematics but direct empirical observations. However, his philosophy was imported to the United States by the logical positivists of the Vienna circle. It was then adopted to legitimise the American empiristic tradition of social sciences, which relied heavily on mathematical tools [33, pp. 1510–1511]. Thus trend extrapolation and other types of deterministic mathematical modelling have historical and epistemological connections to Comte's thinking. Another connection of positivist futures research can be traced back to Rostowian unilinear developmental theory [34].

2.2. Optimistic humanism

The second school of thought states that the professionals formulate the possible alternatives and also evaluate the alternatives. Final decision-making is left for the decision-makers.

This approach has connections to the "critical realism" by Bell [17,35]. According to him, futures researchers should not only outline possible alternatives but also assess which one of the alternatives is best [35, p. 1]. The justification for this task is that values are suggested to be able to be evaluated objectively. Bell seems to think that (liberal) democracy is one of the objective values and therefore the decision-makers are supposed to make the final decision [17, p. 236]. This line of

argument has one problem that Bell seems not to have solved yet: If the goodness of a given alternative is already objectively assessed by the futurist what is left for the decision-maker to decide upon—right and wrong decision?

Not many practices of futures studies follow this school of thought. Bell has attempted it by applying Keekok Lee's "epistemic implication model" for analysis of which of future alternatives are truly good. Lee [36] has made a programme for social ethics based on a "naturalistic" and "rational" analysis of and conclusions from the laws of thermodynamics. Some applications of cost-benefit analysis might be regarded as practical tools for rational evaluation (see e.g. [37]).[4] The rational planning doctrine in planning theory seems to strive for the same goal as well [39]. Bell's approach seems unique with regard to the five other typologies reviewed in chapter 1, but it could be connected to the predictive-empirist approach by Inayatullah, evolutionary futures research by Mannermaa and extrapolation approach by Masini.

2.3. Pluralistic humanism

In the third school of thought the professional forms the alternative futures, the decision-maker evaluates them with the help of the professional and the decision-maker chooses one alternative.

There is a fundamental philosophical difference between this approach and the optimistic humanism described above, as Pentti Malaska has noted recently [40]. The approach implies that there are no objective values to conduct the evaluation. A connection can therefore be established to the Humean 'guillotine': values and knowledge ought to be separated and decisions cannot be made on the basis of knowledge alone [41, pp. 415, 457].[5] Also Popper (e.g. [43, pp. 378, 383–396]) spoke for a more open society with less respect for authorities and criticised strongly historicism, i.e. determinism [44].[6] Georg Henrik von Wright has formed principles of deontic logic, "technical norms", that can be seen as a compatible basis for this school of thought. The purpose of applied scientists would be to analyse and produce means to certain ends, i.e. 'if you want to achieve that goal, you should take this kind of action' [45].

Pluralistic humanism is present in the "what—if" approach in futures studies (e.g.

[4] Cost-benefit analysis has also been criticised of anti-democratic features (e.g. [38]).

[5] Hume [41, p. 415] declared: "Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them". Hume is perhaps more famous of his promotion of a posteriori reasoning over a priori reasoning, i.e. being 'the father of empirism', but this feature of his philosophy is not of primary concern here (see e.g. [42, pp. 42—50]).

[6] We have the ideas of Popper and Bell in different categories although Bell explicitly states his critical realism is in line with that of Popper's. The reason is that Bell is in favour of objective observable criteria. Popper [43, pp. 387—388] did argue in line with Bell that a policy discourse should not end by accepting different contradictory statements equally good, but a critical discussion should always be continued. But this is not saying that a policy is objectively better than another. Popper rather emphasises the incrementalist process of trial and error than that of logical proof [43, p. 386].

[46, pp. 37–40],[7] or "secondary forecasts", as Bertrand de Jouvenel [48, p. 55] called them. Scenarios are typically made in a manner that the futures researcher makes the scenarios and the decision-maker is supposed to choose one, or in some cases several. The French school of *la prospective* includes the same basic idea [49,50]. The approach corresponds Mannermaa's concept of scenario paradigm and locates close to Amara's possible and Inayatullah's cultural-interpretative approach. Masini's vision-oriented approach seems to encompass this as well.

2.4. Polling democracy

A step to a more participatory direction would be the scheme in which a professional forms the alternatives, but the evaluation of the alternatives is based on, for example, weighting of criteria by a decision-maker and surveying public opinion. The gathering of data on opinions, say, by questionnaires or computer programmes, is performed by the professional. The final decision is made by the decision-maker.

The relation between values and knowledge is similar to the pluralistic humanism described above. The emerging assumption in this paradigm is that perhaps the parliamentary democratic system is reacting too slowly or in a biased way to citizens' changing values and attitudes. That is why an inquiry on public opinion is needed to complement the contribution of the decision-maker [29, pp. 466–468; 51, p. 71; 52, pp. 202–203].[8]

This approach is highly logical but the authors are not aware of many such empirical experiments made in the discipline of futures studies. Some public hearing procedures of the Environmental Impact Assessment (EIA) processes in the US as well as televoting might be understood as examples [52]. An urban motorway construction process in Finland also included opinion polling [29]. Some decision analysis and risk assessment methods include weighing of consequences of the alternatives and calculating the subjective optimum alternative [53,54, pp. 57–78]. This school of thought is on the borderline of Amara's possible, probable and preferable. Mannermaa's scenario paradigm, Inayatullah's cultural-interpretative epistemology and Masini's vision approach encompass this school of thought. It is difficult to determine whether it could be based in Bell's category of critical realism because of the emphasis on 'what people *think* is right' instead of 'what *is* right'.

2.5. Critical pragmatism

In this approach the basic assumption of the professional's capacity to outline the 'real' possible alternative futures is abandoned. The professional is only helping decision-makers and the public to form alternatives which they themselves consider

[7] The 'what—if' concept includes also other kinds of interpretations. For example Ravetz defined it as an approach that focuses on highly uncertain impacts of an action which cannot be modeled or otherwise predicted, i.e. what if something goes wrong [47].

[8] Coates reminds that poorly constructed polls are less worthy than no information at all [51, p. 71].

relevant. The evaluation of the alternatives is to be made by public discussions among decision-maker and the public and the final decision is made by the decision-maker.

The philosophical point is that the separation of knowledge and values is not seen as possible at least when forming recommendations. Because all knowledge relevant to decision-making is seen as theory-, interest- and value-laden, the division of labour in forming technical norms is not considered functional. Thus it is best to invite the public to the beginning of the process as well. The position has been suggested at least by planning theorist John Forester from whom the concept of critical pragmatism is adopted [55, pp. 1–14, 24–35, 124–125]. The approach combines the doctrines of pragmatist philosophy and critical theory. The goal of consensus is not adopted here. A package of acceptable rules of social discourse is usually recommended in the critical-pragmatist tradition such as the ideal communication[9] of Apel and Habermas [7, pp. 38–40; 56, pp. 97–169; 57, pp. 369–452; 58; 59].

This kind of approach has been practised quite often in futures research, for example future workshops [60,61], scenario workshops [62] and visionary management [63]. Also the Delphi method can be applied in a way that supports such rules for argumentation [64, pp. 88–89; 65, pp. 83, 131–132; 66]. Recently Keskinen has developed a model of "porous decision making" emphasising organised citizen participation in the information society [67, pp. 248–252]. The school seems to be similar to Sandberg's, Slaughter's and Mannermaa's hermeneutic/practical interest of knowledge and Inayatullah's cultural-interpretative approach and be under the larger category of Masini's vision approach. It seems to locate in the borderline of Bell's critical realism and post-positivism.

2.6. Relativistic pragmatism

The next approach would be to abandon the belief in the professional's capacity to organise the process of forming the alternative futures as well, and 'reduce' her/him to an ordinary citizen. Then the decision-maker and the public would be forming the alternatives as well as evaluating them and the decision-maker would be making the final decision.

Philosophically the difference between this approach and the previous critical pragmatism can be understood as the difference between the positions of Habermas (e.g. [55]) and Richard Rorty [68, pp. 343–344, 377–389; 69, pp. 173–174]. Habermas believed in a systematic organised discussion following the principles of the ideal speech act whereas Rorty, influenced by Quine [74, pp. 23–25], believed in a

[9] Several concepts have been used in different stages to mean the rules of acceptable discourse developed by Apel and Habermas, such as the ideal speech act, undistorted communication, universal pragmatics and transcendental pragmatics.

relativistic non-systematic discussion, because he could not find any universal truth in a rigorous process.[10]

It is somewhat difficult to imagine examples for this school of thought in the futures studies domain, although self-organised futures workshops might be thought of as an example. Methodological connections to this approach can be found in the methods of story-telling, purely heuristic scenario writing, communication camps and causal layered analysis [16,75, pp. 351–352]. This school of thought has qualities of Inayatullah's critical-post-structural approach, Masini's utopia, Sandberg's, Slaughter's and Mannermaa's emancipatory, Amara's preferable and Bell's post-positivism.

Relativism has been criticised by Popper [43, pp. 381–382] and later Bell [17, p. 236], to lead to nihilism. They thought that if no moral position can be considered better than another, people could act any way they pleased and might oppress each other without a ground. The line of thought is logically possible, but not the only one. One might as well claim that because there are no generally approved criteria for goodness, we must have a democratic society to decide upon what kind of laws and norms we need to live by. In fact, the second view is usually promoted by relativists [29,68,69].[11]

2.7. Democratic anarchism

In the last school of thought all the phases are performed by the public. In other words a total direct citizen participation would occur, implying anarchism or some sort of ideal democratic civil society such as Aristotle's "politeia".[12]

Philosophically, the last school of thought presents an extreme version of relativism, where anything goes as an argument, because there cannot be any substantial nor procedural principles to guarantee a good decision. Some connections can be traced back to the thinking of Paul Feyerabend [76, pp. 18–19], who supported the 'anything goes' principle for all inquiries. He also disfavoured argumentation rules and preferred an open process [76, pp. 268–270]. And, like Rorty, he also insisted that his rule, or rather anti-rule, would lead to a more democratic society [76, pp. 12, 251].

But is there a philosophical difference between this democratic anarchism and the former two pragmatist schools of thought? We suggest that the extreme relativist

[10] Calling this and the former school pragmatism has some problems, because the concept originates from Charles Sanders Peirce who was not a relativist but was in favour of the realist theory of objective truth [70, pp. 77—78; 71, pp. 47–49; 72, pp. 353—357]. The concept of pragmatism was made famous especially by William James, whose thinking included more relativistic subjective aspects and are of concern here [73, pp. 37—54; 71, pp. 48—50].

[11] Rorty did not call himself a relativist because for him it was the name of the 'anything goes' principle [69, pp. 166—168].

[12] Anarchism can be interpreted in two ways: First, it can be seen as an overly individualistic and egoistic enterprise as was feared by Hobbes. Second, it can be seen as a form of communicative civil society where social life-world has been emancipated from distorting institutions. The latter perspective is adopted here, hence the pre-fix 'democratic'.

anarchist school would include a metaphysical claim that the reality itself includes many truths, not only different interpretations of one truth as the pragmatists argue [76, p. 270]. The position is present in the Leibnizian metaphysics called ”monadology” [77, pp. 215–271]. There is no logical connection between the theory of truth and theories of participatory democracy, but this assumption makes the gradient complete from the strictest analytical positivist thinking to the most loose heuristic relativism. A second argument for separation is Rorty’s argument against the ‘anything goes’ type of discourse [69, p. 166].

Extreme relativistic thought and anarchism can seldom be found in the texts of futures researchers. Some traces of it can, for example, be found in utopian texts,[13] science fiction literature and movies [11,80]. Of the typologies reviewed in Section 1, Inayatullah’s critical-post-structural epistemology, Masini’s utopian approach and Bell’s post-positivism seem to be closest to these ideas and also Amara’s preferable seems to encompass the most radical version of relativism.

2.8. Summary of the typology

Above, we have examined how the role of professionals, decision-makers and the public could be defined in a long-term planning and decision-making process (also see the Appendix). We formed seven schools of thought, presenting a gradient from extreme technocracy to extreme public participation, and then connected the gradient to futures research practices (Table 1).

We interpreted the seven schools of thought in the light of the philosophical discourse on the role of knowledge and values in making policy recommendations. They seem to form a gradient from strict, analytical, deterministic, value- and knowledge objectivist positivism to loose, interpretative, non-deterministic, value- and knowledge subjectivist relativism (Table 2).

The two gradients from technocracy to citizen participation and from objectivism to relativism seem to converge. However, convergence is not inevitable, because different philosophical positions can lead to similar practical social conclusions and from the same philosophical starting points it is possible to end up with different practical conclusions. In order to establish the connection one must (explicitly or implicitly) also apply some other social premises. For example, extreme relativism can lead to nihilism or to democratic public participation, depending on the other premises.

3. Paradigm shift in Finnish transport futures studies

In this section we use the new typology to analyse the paradigm shift of national transport futures studies made by the Finnish transport administration in the 1990s.

[13] For example the utopy of the ideal communism was meant to emancipate citizens from the “realm of necessity” to the “realm of true freedom”, i.e. leisure time reproduction [78, p. 820]. However, Marx’ epistemology was positivist, not extreme relativist. Also a more relativist and non-deterministic new left branch of Marxism developed in the 20th century (see e.g. [79, pp. 225—235, 241—242, 252].

Table 1
Seven paradigms of the roles of professionals, decision-makers and the public in a long-term decision-making process and some corresponding methodological applications

Phase of planning and decision-making process School of thought	Formation of possible futures	Assessment of desirablity	Final decision-making	Examples of methodological applications
Comtean positivism	Professional	Professional	Professional	Deterministic models
Optimistic humanism (e.g. Bell's 'critical realism')	Professional	Professional	Decision-maker	Epistemic implication model
Pluralistic humanism (e.g. scenario paradigm)	Professional	Professional & decision-maker	Decision-maker	What-if models
Polling democracy (e.g. policy analysis)	Professional	Professional & decision-maker & public	Decision-maker	What-if models including opinion polling
Critical pragmatism (e.g. Forester)	Professional & decision-maker & public	Decision-maker & public	Decision-maker	Future workshops
Relativistic pragmatism (e.g. Rorty)	Decision-maker & public	Decision-maker & public	Decision-maker	Story telling, heuristic scenario writing
Democratic anarchism (e.g. Feyerabend)	Public	Public	Public	Science fiction

3.1. Traffic and automobile stock forecast 1989–2010

As described and analysed in detail in the reference [29], the planning documents of the Finnish Road Administration (FinnRA) in the beginning of the 1990s presented an example of Comtean positivism in the way futures research was carried out and applied in the context of planning and decision-making. In the *Traffic and Automobile Forecast 1989–2010 for Finland* made in 1989–1990 [81], deterministic mathematical models were used and in a road project level case a 'what—if' type of model was used in a deterministic manner.

There were alternative developments of road traffic volumes in the case, but these developments were not formed by varying factors internal to decision-making, but varying the GDP assumption as making a sensitivity analysis. Only the "business as usual" estimate of the most probable future estimated by the futurists was used in the planning process. It was not possible for citizens to participate in forming the alternatives, nor evaluation, nor decision-making.

3.2. Traffic and automobile forecast 1995–2020

There are signs that the futures studies of transport administration changed in 1995 as FinnRA published a follow-up forecast for 1995–2020 [82]. It included three

Table 2
The role and essence of knowledge and values in making policy recommendations in different schools of thought in the new typology

School of thought	Knowledge and values in policy recommendations
Comtean positivism	Recommendations are derived from objective knowledge, values are not needed.
—	*— the line between determinism and indeterminism —*
Optimistic humanism	Recommendations are derived from objective knowledge and objective values.
—	*— the line between value objectivism and value relativism —*
Pluralistic humanism	Recommendations are derived from objective knowledge and subjective values.
Polling democracy	Recommendations are derived from objective knowledge, including knowledge on subjective values.
—	*— the line between epistemological realism and relativism —*
Critical pragmatism	Recommendations are derived from intersubjective knowledge and intersubjective values.
Relativistic pragmatism	Recommendations are derived from subjective knowledge and subjective values.
—	*— the line between argumentation and 'anything goes' —*
Democratic anarchy	Recommendations cannot be derived at all because knowledge is biased and values are too subjective.

alternative scenarios: "business as usual", "market driven" and "sustainable growth". The qualitative background factors of the different road traffic scenarios were presented in tabular form [82, pp. 154–160]. In the actual model calculations the variants were the annual average car kilometres and passenger car density [82, p. 160]. Freight transport figures were not varied.

The scenarios were produced by the futurists within FinnRA and because alternative policy scenarios were offered to decision-makers based on the what-if analysis, the approach could be characterised as pluralist humanism. However, the "business as usual" forecast was elaborated further than the other two scenarios without any alternative figures to be used in project level. It seems that although the futures study itself was made following the what-if principle, the actual role of "business as usual" forecasts in the planning process was not changed. Therefore, as an institutional element the study would belong to optimistic humanism.[14]

3.3. The visionary process 1997–2020

In the late 1980s and 1990s several transport administrators and researchers outside administration proposed that the transport system should be dealt with as a whole, a wider set of factors should be taken into account and more policy alternatives

[14] This does not mean that the professionals would themselves promote optimistic humanism—quite the contrary [83].

should be offered when making futures studies of transport [84, p. 16]. The Ministry of Transport and Communications responded by taking initiative on the matter.

The *Visionary process* was carried out in 1997 by the Ministry. It was conducted to develop a process to produce a vision for the transport system. Four available 'best-practise' mathematical what-if models were used by private consultants guided by administrative officers in the ministry. They calculated a "business as usual" scenario and three alternative transport policy scenarios, or "visions": (1) market driven, (2) regional and social equity driven and (3) environmentally driven [85, pp. 26–29].

The alternative scenarios had similar assumptions about economic growth rate and governmentary budget of transport. No wider life-style issues, structural changes in the economy nor different regional policy options were dealt with [85, p. 21]. The results presented only little difference in terms of traffic volumes and modal split [85, pp. 34–35].

The visionary process was continued by making an evaluation of the different policy goals presented in governmental committee reports. The goals were discussed in seminars within the ministry, and by interviewing representatives in the sectoral transport administration and the Confederation of Finnish Industry and Employers. A questionnaire to transport experts was also made to determine the weightings of the different goals [85, p. 24]. Relying on the expert poll and discussion within the ministry, another scenario called "the target transport system" was specified as a combination of the three alternative visions.

The visionary process could be characterised as pluralistic humanism in the sense that it pursued the formation of alternative policies and involved several groups participating in the decision making process. However, the evaluation of the goals was made by experts, which implies that some traces of the school of optimistic humanism can be found as well. The output was less varied than the FinnRA 1995 scenarios, thus presenting a somewhat incrementalist view of the range of possible policies.

3.4. Traffic scenarios 1999–2025

Whereas the visionary process relied on one external scenario in each transport policy scenario, the *Traffic Scenarios 2025* project was carried out to form wider scenarios of factors affecting transport [86, p. 1]. It was performed by a group of consultants without economic interest in technical transport planning, the corresponding author belonging to the group.

Instead of mathematical models, an application of the scenario workshop method developed by Tarja Meristö [62] was used, presenting a more communicative and less formal approach. Several methods were used under the umbrella of the scenario workshop: working groups, a Delphi study and participatory seminars for interest groups. Thematic expert interviews were performed on three specific, less investigated topics, namely air transport, soft modes and values, and attitudes relevant to transport behaviour. The Delphi and the expert interviews were used to gather poss-

ible future developments of relevant factors, which were then gathered to a morphological matrix [86].

The international scenarios were formed based on the literature, global scenarios made by Shell and World Business Council for Sustainable Development (WBCSD) and another set of scenarios for Europe made by Meristö, being similar to scenarios made by the Forward Studies Unit of the EU [86, pp. 16–24].

A more specific set of traffic scenarios was formed in connection with the European and global scenarios. In the seminars for interest groups the scenarios were outlined, criticised, rephrased, grouped and reformed [86, pp. 26–28]. This feature would make the Traffic Scenarios 2025 project an example of critical pragmatism. However, the first outline of the traffic oriented scenarios was made based on a literature review of one of the consultants [86, p. 25] (see [87]). Although the scenarios were substantially changed in the course of the project and the final scenarios were different from the first outline, this feature makes the exercise reminiscent of polling democracy as well.

The final traffic scenarios were grouped under five characterising headlines, which were called 'scenario channels' in the report: scenarios of economic growth, scenarios of structural change, scenarios of changed values, collapse scenarios and scenarios of technological leaps [86, pp. 9, 34–36]. Although the method was qualitative, quantitative estimates of passenger transport and freight transport were specified to illustrate concretely the differences between the scenarios [86, pp. 70–73].

The wide range of scenarios produced in Traffic Scenarios 2025 project was used in forming the transport strategy of Finland called *Towards Intelligent and Sustainable Transport 2025* by the Ministry of Transport and Communications [88]. None of the scenarios was adopted as such but a combination of two was constructed within the ministry. In the strategy report, different variables had different time scales and the freight transport volume was suggested to grow clearly faster than passenger car traffic. Some inconsistency can therefore be observed.

The procedural development of the futures studies of transport administration in the 1990s can be summarised as follows (Fig. 2): In the beginning of the 1990s it

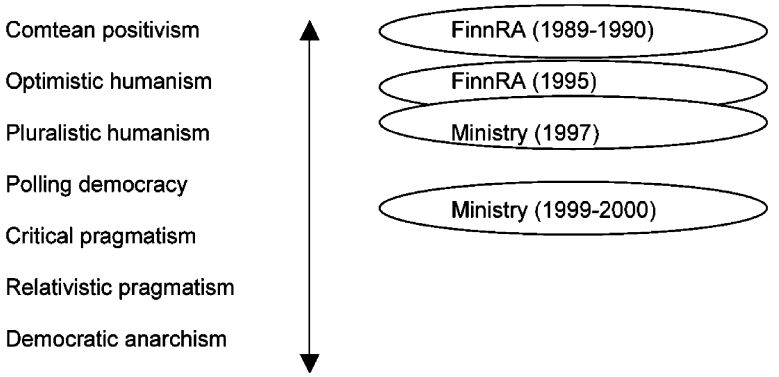

Fig. 2. The development of Finnish national transport futures studies in the 1990s.

presented Comtean positivism, then moved towards a mixture of optimistic humanism and pluralistic humanism in the middle of the decade. At the end of the decade, a mixture of polling democracy and critical pragmatism was experimented with. The paradigm shift was impressive.

4. Discussion

The purpose of the article was to continue the work of reviewed authors in order to construct a new typology of futures studies paradigms. The new typology consists of seven paradigms which are mapped onto the reviewed typologies in Table 3. What can be usefully drawn from the new typology?

First, the typology can increase self-understanding and learning in more practical works; are we involved in policy processes implying philosophical positions which contradict our own basic assumptions?

Table 3
A meta-map of six typologies of futures studies paradigms in relation to the new typology: An analysis of the differences and similarities[a]

	Amara 1981	Sandberg 1975 Slaughter 1982 Mannermaa 1986	Inayatullah 1990	Mannermaa 1991	Masini 1993	Bell 1997
Comtean positivism	Probable	Technical	Predictive–empirical	Descriptive	Extrapolation	Positivism
Optimistic humanism	Probable, possible & preferable	Technical	Predictive–empirical	Descriptive & Evolutionary	Extrapolation	Critical realism
Pluralistic humanism	Possible & preferable	Hermeneutic/practical	Cultural–interpretative	Scenario paradigm	Vision	Critical realism
Polling democracy	Possible & preferable	Hermeneutic/practical	Cultural–interpretative	Scenario paradigm & evolutionary	Vision	Critical realism
Critical pragmatism	Preferable	Hermeneutic/practical & Emancipatory	Cultural–interpretative	Scenario paradigm & evolutionary	Vision	Critical realism
Relativistic pragmatism	Preferable	Hermeneutic/practical & Emancipatory	Cultural–interpretative	Evolutionary	Utopia	Post-positivism
Democratic anarchism	Preferable	–	Critical–post–structural	–	Utopia	Post-positivism

[a] The connections relate only to questions of forming alternatives, evaluating the alternatives and making the decision, as well as the views on knowledge and values in forming policy recommendations (see Tables 1 and 2). The six typologies also present other characteristics which are outside the scope of the map, such as theories of change, the futurist's individual morals, theories of social development, perceptions of time etc. Thus, this Table should not be regarded as a complete summary of the typologies of futures studies paradigms.

Second, it can be used as a yardstick for normative analysis (depending on one's position); how far are we from our own ideal? Or as a value objectivist might ask: how far are we from the true ideal?

Third, the new typology can be used as a tool for analysis of empirical policy processes; which school of thought does a case represent? We analysed four empirical cases of administrative transport futures studies in Finland during the 1990s and conclude that the new typology is a good analytical tool to reveal the rapid paradigm shift, which the cases represent. However, we must keep in mind that the actual planning processes on a project level may well be lagging behind. We can only imagine how much confusion and resistance the paradigm shift has provoked in regard to the many philosophical barriers trespassed.

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Appendix A. : Forming the typology by using the Futulogic method

This appendix presents the Futulogic method of producing the new typology of futures studies paradigms. The phases of the method are as follows:

- dividing two categories of interest into sub-categories,
- cross-matrixing the sub-categories,
- opening the space of logically possible alternatives,
- cutting the open space by theoretically grounded criteria,
- removing less relevant (non-understandable and almost overlapping) alternatives,
- theoretical interpretation of remaining alternatives.

Dividing and cross-matrixing categories

First, long term planning and decision-making is broken down into three main phases:

1. formation of the alternatives (problem formulation, production of policy alternatives and forecasting the impacts of the alternatives),
2. evaluation of the alternatives,
3. making the decision.

Another point of interest are the roles of different actors involved in the process.

The main actors involved in the process can be divided into three groups as well (see [89, p. 679] and Section 2 in the main body of text):

- (dec)decision-makers (politicians, managers, judges and other formal authorities),
- (pro)professionals (futurists, consultants, administrative officers, researchers and other experts),
- (pub) the public (interest groups as well as individual citizens and media).

Opening the logical possibility space

The phases can be cross-matrixed with the actors so that each actor can be positioned to any phase of the process. Because there are x^y ways to combine the three phases (y) logically with the three groups (x), it follows that there are $(3^3)=27$ alternative ways of defining the role of professionals, the public and decision-makers in a long term decision-making process. However, two or three of the groups may in practice participate in the same phase. This raises the number of alternative solutions within a phase to seven. It follows that the number of alternative logical solutions to the whole process is increased to $7^3=343$ (www.tukkk.fi/tutu/Julkaisut/pdf/Tutu3_01.pdf).

It is important to note that, if professionals are mentioned together with public, it means that professionals have a special role in the process. If the professionals do not have a special role in the process, they are categorised here as the public, no matter how much expertise they possess.

Cutting the logical possibility space

Now we have opened the space of logically possible hypothetical schools of thought from the matrix. It is obvious that some of the logical possibilities are irrelevant and 343 possibilities are too many to be practically analysed or illustrated one by one. Thus, we will proceed by scanning the open space with explicit selection criteria. Riner [90, p. 318] provides one criterion in his continuum of "*'Softer', more qualitative, synthetic" vs "'Harder', more quantitative, analytical*" objectives and methods in futures research. Slaughter's continuum from "*futures research*" to "*futures movement*" includes a similar idea [11, p. 6]. Another tool is adopted from Tapio [29], namely the gradient from technocracy to citizen participation. These continuities seem to converge rather than cross each other.

One line of samples from the logically open space can then be formed by starting from extreme technocracy (pro—pro—pro) towards including decision-makers and then the public. The other end of the continuum consists of extreme direct public participation (pub—pub—pub).

Let us assume that it is relevant to start the widening of actors involved from the phase of the final decision by including decision-makers into the scheme and move on to include decision-makers to earlier and earlier phases of the process. This is because the claim for increasing participation in the earlier phases of the process implies important epistemological foundations and the claim for maintaining the

phase of forming alternatives in the hands of professionals seems to be 'the last resort' of realistic and positivist epistemologies.

Importing the public to the process can arguably be formed differently. Final decision-making can be seen as 'the last resort' of the point of having decision-makers at all, especially in a representative system. Importing public to the process would probably mean a broader base for decision material at the first stage. Therefore, when dealing with the decision-makers and public only, we would start importing the public from the beginning of the process.

With the two 'last resort' arguments mentioned above, we start by dropping the professionals from the final decision phase and holding them as long as possible as the only actors in the first phase of forming the alternatives. Thus we start importing the public to the middle of the process, i.e. evaluating the alternatives. In the latter stage there are two alternatives: to first exclude professionals altogether or to first include the public in the final decision phase. We leave the scheme open for these options for now.

Fig. 3 illustrates the alternatives that have so far been cut theoretically from the open space of logical possibility. The alternatives form a gradient of 15 hypothetical schools of thought making the gradient from technocracy to citizen participation logically well-argued. We have thus reduced the alternatives under scrutiny from 343 to 15 with fairly few assumptions.

Relevance analysis

In the next phase we will exclude those options that seem to have no relevant interpretation, meaning the ones that seem not to have an understandable interpret-

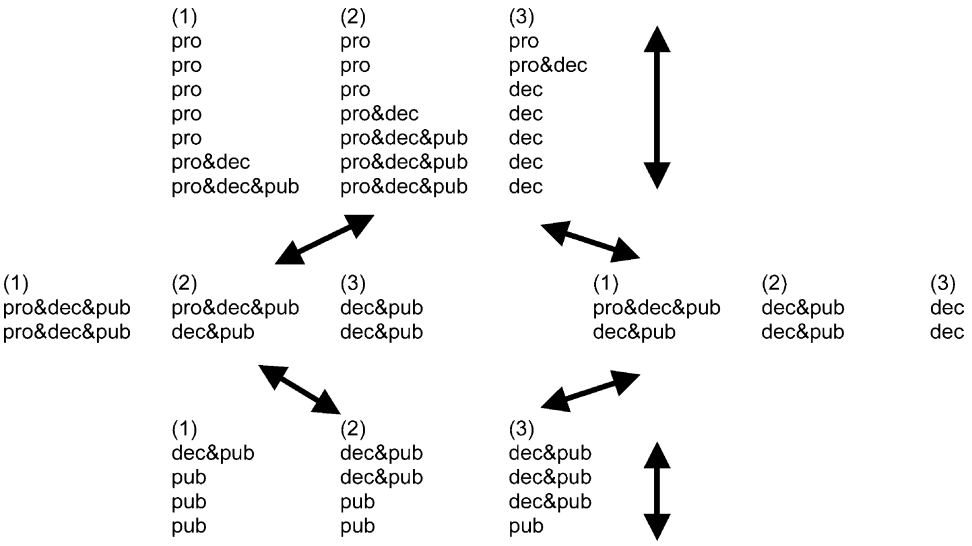

Fig. 3. The continuum from technocracy to citizen participation based on cutting the logically possible space theoretically.

ation, and the ones that do not imply differences in underlying philosophy (practically overlapping).

Of the 15 hypothetical schools of thought the six that had more than one actor group in the last phase of final decision-making seemed to lack understandable interpretation. It is difficult to grasp the idea and point of, for example, a voting system capable of simultaneously combining elected decision-makers and the public. Thus we are left with nine schools of thought.

We further combine (pro—pro&dec&pub—dec) with (pro&dec—pro&dec&pub—dec) and (pro&dec&pub—pro&dec&pub—dec) with (pro&dec&pub—dec&pub—dec), because they seem similar to each other in terms of philosophical implications. The point is illustrated further in Section 2.8. Thus we finally end up with seven schools of thought:

(1)	(2)	(3)
pro	pro	pro
pro	pro	dec
pro	pro&dec	dec
pro	pro&dec&pub	dec
pro&dec&pub	dec&pub	dec
dec&pub	dec&pub	dec
pub	pub	pub

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